PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Robert C.U. YU et al.	Group Art Unit: 1791
Application No.: 10/743,179	Examiner: M. DANIELS
Filed: December 23, 2003	Docket No.: 118087

For: IMPROVED STRESS RELEASE METHOD AND APPARATUS

DECLARATION UNDER 37 C.F.R. §1.132

I, Robert C.U. Yu, a citizen of the United States, hereby declare and state:

1. I have a PhD degree in Physical Polymer Chemistry, which was conferred upon me by the University of Michigan in Ann Arbor, MI in 1973.

2. I have been employed by Xerox Corporation since 1981 and I have had a total of over 34 years of work and research experience in polymer science and engineering fields.

3. I am a member of AICHE, American Chemical Society, and a Recipient of RIPLA Inventor of the Year in 1999.

4. My publications include the following works in this field: Polymer Materials and Engineering, and my public appearances include speaking on Elastomer Physics and Polymers for Dental Implants and Restorations before International Dental Association Conferences, American Chemical Society and internal Xerox Seminars.

5. I am a named inventor in the above-captioned patent application.

6. I have a professional relationship with the assignee of the above-identified patent application. In the course of that professional relationship, I received compensation directly from the assignee for my work relating to electrophotographic imaging member belt research and development. I am not being compensated for my work in connection with this Declaration.

7. I am a Xerox Corporation President Award winner in 1997 and a five-time Xerox Corporation Eagle Award Recipient.

8. The following technical discussion is being provided to demonstrate the clear differences between the presently claimed invention and the references cited in the November 20, 2007 Office Action.

a. Foltz *et al.*

Foltz *et al.* (Foltz) describes a batch heat treatment annealing process used in the initial manufacturing of imaging member belt materials. In Foltz, the imaging member web is unwound from a roll of web stock so that the charge transport layer faces outwardly (Foltz, col. 10, lines 1-17). The imaging member web is then conformed to the outer surface of the processing tube where it is parked over the processing tube in such a manner that the imaging member web makes contact with the outer surface of the processing tube over an angular bending range between the points a and b (Foltz, col. 10, lines 1-17). The processing tube then heats and cools the imaging member web, between points a and b, when it is stopped in the parked state over the processing tube (Foltz, col. 10, lines 38-51).

The heated outer surface of the processing tube first heats the underneath surface of the bent contacting a-b segment of the imaging member web such that the temperature of the charge transport layer is raised, by vertical heat conduction through the entire member thickness, to a temperature that is at least about several degrees above the glass transition temperature of the material forming the charge transport layer (Foltz, col. 10, lines 63-70). Once the charge transport layer is heated to the desired temperature, the imaging member web is then cooled to a temperature below the glass transition temperature (Foltz, col. 11, lines 30-47). The cooled imaging member web is subsequently advanced by a distance equal to the distance between points a and b and the next segment is then directly over the processing tube and subjected to the same heating and cooling process (Foltz, col. 11, lines 48-55). Although

the heating is conducted in order to reduce or eliminate internal cross-web stress and strain in the imaging member belt materials, nonetheless, lateral heat conduction does inevitably occur beyond the a and b points to reach the prior heat treated segment.

Therefore, when the next segment of the web is heated, at least a portion of the cooled segment that was previously treated, but that is now in a flat configuration and no longer in contact with outer surface of the processing tube, is also reheated due to the effect of lateral heat conduction from the heated a-b segment as well as from the heat radiation emitted by the outer surface of the heat processing tube. Consequently, the combination of lateral heat conduction and the radiation heat destroys/negates at least a portion of the annealing result that was performed during the previous batch anneal process. In conclusion, Foltz's method is essentially a stop and go batch heat-treatment process, not a continuous imaging member web heat stress-release treatment process.

The present disclosure describes a continuous heat treatment process. In this continuous process, the imaging member web stock is directed, with the transport layer facing outwardly, to pass over and in contact with the surface of a selected roller that creates a spontaneous transverse tension that expands the member in perpendicular direction of the web stock prior to its speeding toward the surface of a circular metallic tube making entering with bending contact at 12 o'clock with a heat stress release treatment tube. The transport layer is then instantaneously heated, by a localized and narrowly focused IR radiant line, to a temperature above the glass transition temperature of the charge transport layer. The transport layer is then cooled to a temperature below its glass transition temperature, while it is still under the bending condition, just before the web stock leaves the tube to complete the imaging member web stock stress release processing treatment.

The continuous process is a significant improvement over the batch process, such as described in Foltz, because the web stock is quickly moved away from the heat source after it

is cooled to a temperature below the glass transition temperature. This prevents/eliminates the lateral conduction of heat down the treated charge transport layer and it also prevents the treated charge transport layer from being exposed to heat that is radiated from the heat stress release treatment tube. This has the effect of preventing the reintroduction of internal web and cross-web directional stress and strain into the charge transport layer while also reducing the imaging member production throughput time it takes to process the desired length of web stock.

b. **Taniishi *et al.***

Taniishi *et al.* (Taniishi) discloses a process to fabricate a concave roller to be used in an apparatus that fixes a toner image onto a paper substrate in an electrophotographic imaging apparatus; it does not relate to the heat treatment of imaging member web stock (Taniishi, col. 1, lines 7-16). The apparatus is a dual roller system that consists of a concave roller that is used to press a toner image onto a carrying paper substrate by pressing it against a heated solid rigid roller (Taniishi, col. 1, lines 10-20). Taniishi's concave roller is composed of a metal core that is covered with a thick, flexible silicone rubber layer (Taniishi, col. 1, lines 45-50). The silicone rubber layer is used to generate a linear force in the transverse direction of the paper substrate, which stretches the paper substrate from the center toward its lateral edges (Tanishi, col. 1, lines 32-40). The paper substrate is stretched as it passes through the dual roller apparatus so that wrinkles are not formed on the paper substrate that would degenerate the quality of the toner image (Taniishi, col. 1, lines 20-30). The silicone rubber layer is also useful for preventing the offsetting of the toner (Taniishi, col. 1, lines 45-50). In essence, the making of a concave roller requires having a flexible elastomer outer layer on a metallic core and the paper wrinkling elimination process requires having a compression roller pressing against the flexible concave roller.

The present disclosure describes the use of a selected roller during the process of heat treating the electrophotographic imaging member web stock to substantially eliminate the internal tension strain caused by the charge transport layer material matrix. The heat treatment process is performed prior to fabricating the web stock into flexible imaging member belts that are used in an electrophotographic imaging apparatus. The selected roller is used to create a spontaneous transverse tension that expands the member in a direction perpendicular to the direction in which the web stock is traveling, while it is under a required web directional tension, immediately prior to making contact with the heat treatment tube. The transverse tension expands the web stock from the center towards its lateral edges, in accordance with the effect of the principle of Web Normal Entry Law, to prevent micro ripple formation induced by the heat stress release treatment tube to thereby provide a significantly improved annealing treatment.

In comparing the present disclosure and claims to Taniishi, the selected roller of our claimed invention is used during the manufacturing process of the flexible imaging member belts, which are subsequently used inside an electrophotographic imaging apparatus. However, Taniishi's concave roller is one of the parts of an electrophotographic imaging apparatus that is used to transfer a toner image onto a paper substrate and it is accomplished by using only heat with the addition of a compression roller. Additionally, our selected roller in the claimed invention is used to prevent the formation of micro ripples in the electrophotographic imaging member web stock that can be effectively achieved only by, as dictated by the Normal Entry Law, having the imaging member web travel under a required and specific web tension. On the other hand, Taniishi's concave roller is used to prevent wrinkles from forming on the paper substrate during the transfer of the toner image. Therefore, the selected roller is used in a completely different process and under different operational conditions than Taniishi's concave roller for a completely different purpose.

9. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: 1/22/2008

Robert C.U. Yu

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